AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method for detecting range to a moving object, comprising the steps of:

projecting continuous wave energy simultaneously at two different frequencies towards the moving object from an antenna; and,

estimating range from the antenna to the moving object based on the phase difference between outgoing and reflected waves of the two frequencies at the antenna.

2. (Original) The method of Claim 1, wherein the moving object is moving at a constant velocity.

3. (Original) The method of Claim 1, wherein the moving object is moving at a non-constant velocity.

4. (Original) The method of Claim 1, wherein the phase difference between the outgoing and reflected waves is used to establish respective temporal waveforms and wherein the estimating step estimates the range based on the relative phase relationship between the temporal waveforms.

5. (Currently Amended) The method of Claim 4, wherein the range estimation step includes the steps of providing a number of frequencies templates and generating for a first one of the

frequencies templates of a number of temporal waveforms, each corresponding to a different range and comparing the waveform associated with the first frequency and derived from measured data with each of the templates, with a match establishing the range to the object, whereby the range to a non-uniformly-moving object can be estimated.

6. (Original) The method of Claim 5, wherein the step of generating a template includes the steps of predicting from a waveform of the other of the frequencies the waveform of the first frequency that should exist at a given range and wherein the template to which the waveform corresponding to the measured data is compared is a predicted waveform

7. (Original) The method of Claim 6, wherein the compared waveforms are associated with the first frequency.

8. (Original) The method of Claim 1, wherein the frequency separation between the two frequencies defines the range resolution, with smaller frequency separation resulting in increased resolution.

9. (Original) The method of Claim 8, wherein the frequency separation determines the length of a range cell.

10. (Original) The method of Claim 9, wherein the two frequencies are in the hundreds of megahertz band and wherein the frequency separation is at least one megahertz.

11. (Currently Amended) A method for estimating the range to a non-uniformly-moving object, comprising the steps of:

simultaneously projecting from an antenna continuous wave energy simultaneously at two different frequencies towards the moving object which reflects incident wave energy back to the antenna; and,

estimating the range to the non-uniformly-moving object based on the phase difference between outgoing and reflected waves of the two frequencies reflected by the object to the antenna.

12. (Original) The method of Claim 11, wherein the range estimation step includes the step of generating waveforms corresponding to the phase differences between outgoing and reflected waves.

13. (Original) The method of Claim 12, wherein the estimation step further includes from waveforms associated with a first one of said frequencies generating a set of range-dependent waveform templates corresponding to the second of the frequencies and comparing a waveform at the second frequency derived from measured data with each of the range-dependent waveform templates to ascertain by matching techniques which template is closest, and thus the estimated range to the non-uniformly-moving object.

14. (Currently Amended) Apparatus for the estimation of the range to a moving object, comprising:

a two-tone radar for generating continuous wave energy simultaneously at two different frequencies;

an antenna coupled to said radar for simultaneously projecting continuous wave energy therefrom;

a pair of mixers coupled to said antenna and said radar for generating waveforms corresponding respectively to the phase difference between outgoing and reflected energy at said antenna for each of said two different frequencies; and,

a range estimation unit coupled to said pair of mixers for estimating range to said moving object.

15. (Original) The apparatus of Claim 14, wherein said radar includes two frequency sources for generating continuous wave energy at said two frequencies, and means for coupling an output of each of said frequency sources to a respective mixer.

16. (Original) The apparatus of Claim 14, wherein said radar is a microwave radar and wherein the frequency separation between said two frequencies is at least one megahertz.

17. (Currently Amended) The apparatus of Claim 14, wherein said range estimation unit includes a predictor for generating from a temporal waveform corresponding to the phase difference between outgoing and reflected energy at the second of said frequencies a series of range dependent waveforms corresponding to ~~the~~ an expected temporal phase difference of returned continuous wave energy at a first one of said frequencies, and a waveform matching unit for establishing a match between one of said range-dependent waveforms and the output of the mixer associated with said first one of said frequencies.

18. (Original) The apparatus of Claim 17, wherein said predictor has as one of its inputs the output of the mixer associated with the second of said frequencies.